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Cockroach genera whose adult males lack styles. Part I. (Dictyoptera: Blattaria: Blattellidae)

by

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With 10 figures

Abstract

Diagnostic characters are given for the following four genera whose adult males lack styles: *Arawakina* Hebard, *Neoloboptera* Princis, *Loboptera* Brunner, and *Astyloblatta* Bey-Bienko. Two genera, *Blattellina* Princis and *Dewittea* Hanitsch, are redescribed even though their males are unknown. The female of the former has characters similar to winged females of *Neoloboptera.* The male characters given for *Dewittea* were based on two misidentified species one of which, *Dewittea spinifera* Princis is transferred to *Jacobsonina,* and the other *Dewittea globulifera* Princis, whose male has styles, is placed in a new genus *Nondewittea.* Two new species, *Neoloboptera mandelsae* and *Neoloboptera reesei* are described. *Caboverdea loboptera* Princis is transferred to *Loboptera. Scalida tricaudata* Hebard is transferred to *Jacobsonina.*

INTRODUCTION AND MATERIAL

Few cockroach genera have adult males that lack styles. Among ovoviviparous Blaberidae, the adult males of Panesthiinae lack these structures, but nymphs possess them (Roth 1977: 5). Adult females always lack styles but young female nymphs may have them; late instar nymphal females lack styles.

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In this paper I will be concerned only with those Blattellidae genera in which the absence of styles in adult males is characteristic, or possibly characteristic of all members of the genus. Not included are those genera whose species may or may not have styles. However, astylar males that belong to a genus with or without styles, should be carefully compared to those genera in which all the males lack styles. For example, *Scalida tricaudata* Hebard is the only member of the genus whose male lacks styles (HEBARD 1929: 53). I have seen the type and clearly it is not a *Scalida* but belongs in the genus *Jacobsonina*. The males of *Phyllodromica (Lobolampra) montana* Chopard and several other species of the "*montana* group" lack styles whereas other species of *Phyllodromica* have a small left style only (BOHN 1987: 294). Species of *Nocticola* (Nocticolidae) may or may not have styles (ROTH 1988: 298). In his diagnosis of *Anaplecta* Burmeister, HANITSCH (1915: 31) incorrectly claimed that the males lack styles. *Anaplecta javanica* Saussure supposedly lacked styles (HANITSCH 1928: 12) and *Anaplecta vittata* Hanitsch was described from two males which HANITSCH (1923: 396) thought were females, apparently because he did not see the very small styles (ROTH, in press). HANITSCH (1933: 133) placed *Parasigmoidella beccari* Hanitsch in that genus provisionally, and stated that it lacks styles. I have examined the type species, *Parasigmoidella marginalis* Hanitsch, and several other species of the genus. All of the males have styles, and other differences indicate that *beccari* belongs in another genus; if the species lacks styles it may be a *Parascalida* or *Jacobsonina*.

This paper deals with the following genera whose males lack styles: *Arawakina* Hebard, *Neoloboptera* Princis, *Astyloblatta* Bey-Bienko, and *Loboptera* Brunner. The first three genera have Type A front femurs (anteroventral margin with a row of large stout setae that decrease in size towards the distal part of femur, terminating in 2 or 3 large spines: Type A_2 or A_3). The front femur of *Loboptera* is variable and may be Type A, Type B (anteroventral margin of front femur with 1 or more large proximal spines, followed by a row of piliform spinules, terminating in 2 to 4 terminal spines: Type B_2-B_4), or intermediate between Type A and Type B (the spines become very short and among them may be some piliform spinules of the same length).

The male of *Blattellina* Princis is unknown but is included because the female characteristics are similar to winged forms of *Neoloboptera*. *Dewittea* Hanitsch also is discussed even though it too was based only on the female. PRINCIS' description of the male characters of *Dewittea* were based on two species, one of which is a *Jacobsonina;* the other species, *D. globulifera* has styles and I have described it in this paper as *Nondewittea* n. gen.

There are at least six other blattellid genera whose adult males lack styles. They have Type B front femurs, and will be described elsewhere: *Astylella* Princis, *Caffroblatta* Rehn, *Jacobsonina* Hebard, *Parascalida* Hanitsch, *Phymatosilpha* Princis, and *Pseudoceratinoptera* Hanitsch.

The specimens were borrowed from, or are now housed in the following institutions:

(ANSP) Academy of Natural Sciences of Philadelphia, PA, USA; Mr. d. Azuma.

(BZMB) Bereich Zoologisches Museum: Museum für Natürkunde an der Humboldt-Universität zu Berlin, Germany (DDR); Dr. Kurt K. Günther.

(MCZH) Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.

(MHNG) Natural History Museum, Geneva, Switzerland; Dr. V. Aellen and Dr. B. Hauser.

(MRAC) Musée Royal de l'Afrique centrale, Tervuren, Belgium; Dr. H. M. André.

(NMWA) Naturhistorisches Museum Wien, Vienna, Austria; Dr. U. Aspöck.

(UZMC) Universitets Zoologiske Museum, Copenhagen, Denmark; Dr. H. Enghoff.

(ZILS) Zoological Institute, Lund, Sweden; Dr. R. Danielsson.

SUBFAMILY PLACEMENT OF GENERA

In the Blattellidae, those genera whose males have the genital hook on the left side, and females that rotate their oothecae prior to deposition, belong in the Blattellinae, Ectobiinae, and Nyctiborinae. Those males with the genital hook on the right side have females that do not rotate their oothecae and belong in the Plectopterinae (McKittrick 1964). Recently the Plectopterinae has been replaced by the Pseudophyllodromiinae (Vickery & Kevan 1983: 157).

Among the blattellid genera whose males lack styles, *Arawakina* is the only one that has the hook on the right side which places the genus in the Pseudophyllodromiinae. All the other genera have the hook on the left side and belong in the Blattellinae; other characters rule out the Ectobiinae and Nyctiborinae. Recently Bohn (1987) has found exceptions to McKittrick's "rule" in the Ectobiinae and shown that a genus may have some species whose males have the hook on the right or left sides. Bohn suggests that correct placement of genera in their respective subfamily should be determined by whether or not the female rotates the ootheca prior to deposition. I (Roth 1989) found that *Margattea nimbata* (Shelford) rotates its ootheca, but the male has the genital hook on the right side and consider the genus to belong to the Blattellinae. Unfortunately oviposition behavior is unknown for most species, but the position of the males genital hook can be used to provisionally place the genus in its subfamily.

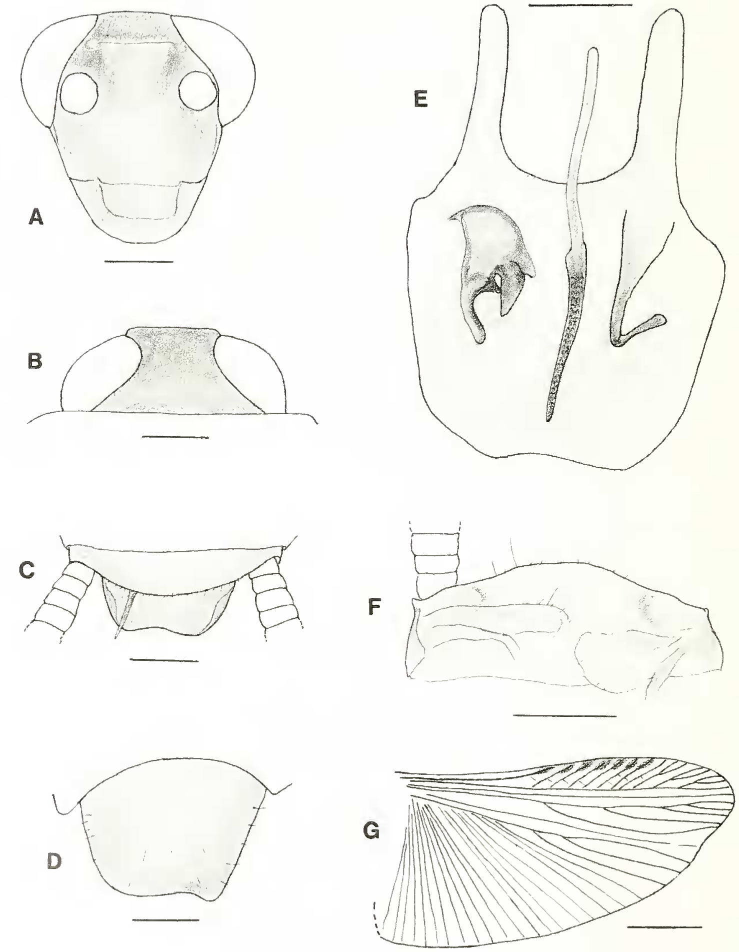
Generic Diagnoses and Descriptions of Species

Arawakina Hebard

Arawakina Hebard, 1926: 174. Type species, *Arawakina frontalis* Hebard, by monotypy.

Diagnosis (♂ only). Head with a transverse ridge between ocellar spots (Figs 1A, 1B). Tegmina and wings fully developed, discoidal sectors of former longitudinal. Hind wing with most proximal unbranched costal veins strongly clubbed, discoidal vein straight, unbranched, median and cubitus veins straight, the former unbranched, the latter with complete branches only, apical triangle small (Fig. 1G). Anteroventral margin of front femur with stout spines that become gradually smaller towards distal end of femur, terminating in 2 larger spines (Type A_2); 4 proximal tarsomeres with pulvilli, tarsal claws symmetrical, minutely toothed on ventral margins [Hebard incorrectly stated that the claws have a "poorly developed flange which lacks teeth"], arolia present. Abdominal terga unspecialized. Styles absent (Figs 1C, 1D, 1E). Hooklike genital phallomere on right side, without a subapical incision, median phallomere rodlike, tapering on distal half.

Comments. Only one species of *Arawakina* is known. The minutely toothed tarsal claws, strongly clubbed costal veins of the hind wing, and Type A front femur, are characters shared by *Neoblattella* Shelford and other South and Central American genera, at one time placed in this genus. *Arawakina* probably arose from a *Neoblattella*-like ancestor that possessed styles, and apparently is not closely related to the other astylar genera, as some of them are to each other.



FIGS 1A-1G.

Arawakina frontalis Hebard, males. A-F holotype: A, head (frontal); B, head (dorsal; truncate margin between eyes is interocellar ridge); C, supraanal and subgenital plates (dorsal; apex of median genital phallomere protrudes between plates); D, subgenital plate (ventral); E, subgenital plate and genitalia (dorsal); F, supraanal plate and paraprocts (ventral); G, paratype from same locality as holotype, hind wing. Scales (mm): A-F, 0.5; G, 2.0.

Arawakina frontalis Hebard (Figs 1A-1G)

Arawakina frontalis Hebard, 1926: 175, pl. 14, figs 9, 10 (♂); Bruijning 1959: 69; Princis 1969: 800.

Holotype. Male (terminalia slide 419), British Guiana, Bartica, 27.XII.1912, H. S. Parish, Type No. 5425 (ANSP).

Paratypes. British Guiana, same locality and collector as holotype, 1♂, 10.XII.1912 (ANSP). French Guiana. Nouveau Chantier, 1♂ (only 1 wing mounted on plastic, and terminal abdominal segments in glycerine), February, collection Le Moult (ANSP).

Male. Head with interocular space slightly less than distance between antennal sockets (Fig. 1A). Third segment of maxillary palps slightly longer than the fourth and fifth segments.

Pronotum flattened.

Hind wing with distal branched costal veins not clubbed, cubitus vein with 4 complete branches, apical triangle small (Fig. 1G). Supraanal plate strongly transverse, hind margin broadly convex, right and left paraprocts similar, simple plates (Figs 1C, 1F). Subgenital plate asymmetrical, protruding well beyond hind margin of supraanal plate, lateral margins curled inwards (Figs 1C-1E). Genitalia as in Fig. 1E: genital hook without a subapical incision or spine; median phallomere rodlike, distal half roughened, tapering, its apex may protrude from between supraanal and subgenital plates (Fig. 1C).

Coloration: Brownish yellow. Lateral regions of pronotum, marginal field and covered portion of right tegmen, and wings hyaline with faint yellowish tinge, this slightly darker distad and in region of costal veins of wings.

Female. Unknown.

Measurements (mm) (from Hebard). Body length, 10.0-10.9 ("abdomen squeezed out"); pronotum length × width, 2.6-2.7 × 3.2; tegmen length, 10.4-10.6.

Blattellina Princis
(Blattellidae)

Blattellina Princis, 1951: 58. Type species, *Blattellina indica* Princis, by monotypy.

Diagnosis (♀ only). Tegmen and wings fully developed, the former with discoidal vein unbranched, discoidal sectors slanted (Fig. 2D). Hind wing with discoidal vein simple, costal veins not clubbed, median vein simple, almost straight, cubitus vein weakly concave, with one small complete branch distad, apical triangle small (Fig. 2C). Front femur Type A_3 (Fig. 2B); ventral margins of mid and hind femurs strongly spined, 4 proximal tarsomeres with pulvilli, tarsal claws symmetrical, unspecialized, arolia present.

Comments. Unfortunately the male is unknown and is needed to complete the diagnosis. I am including the genus in this study because the female characters are similar to those of winged species of *Neoloboptera*, namely *N. mandelsae* and *N. reesei,* except that in these two new species the cubitus vein of the hind wing is more concave and lacks branches. If the male of *Blattellina indica* is found to lack styles, probably *Neoloboptera* will prove to be a synonym of *Blattellina.*

Blattellina indica Princis (Figs 2A-2D)

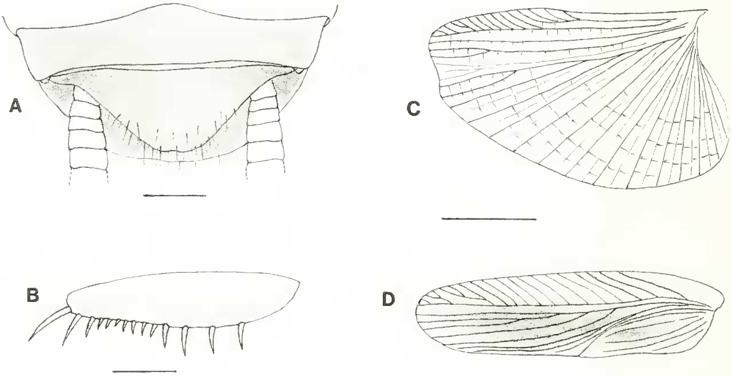
Blattellina indica Princis, 1951: 58, pl. 6, fig. 60 (♀); 1969: 873.

Holotype. Female, northeast India, Santal Parganas, Dr. Bögh (UZMC).

Male. Unknown.

Female. Interocular space same distance as space between ocelli and antennal sockets.

Pronotum convex, anterior margin almost straight, lateral margins convex, widest behind middle, hind margin weakly convex. Supraanal plate broadly trigonal apex rounded, reaching to about hind margin of subgenital plate (Fig. 2A).



FIGS 2A-2D.

Blattellina indica Princis, female holotype. A, terminal abdominal segments (dorsal); B, front femur (anterior); C, hind wing; D, tegmen. Scales (mm): A, B, 0.5; C, D, 3.0.

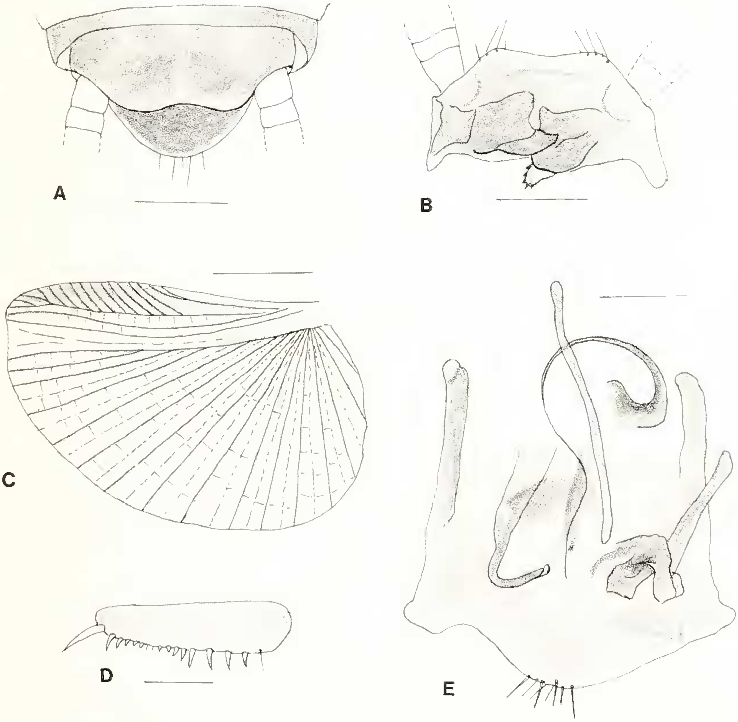
Coloration: Head brownish. Pronotal disk washed out dark brown, surrounding region lighter and partly hyaline. Tegmina light brown, darker on posterior half (Fig. 2D), covered portion of right tegmen hyaline, colorless. Hind wing with costal vein area, apex of anterior field, and small region behind apical triangle weakly infuscated, veins dark brown, remainder essentially colorless (Fig. 2C). Abdominal terga brown, anterior 4 segments lighter. Abdominal sterna and legs light brown. Cerci light greyish brown dorsad, the edges and ventral surface dark brown.

Measurements (mm). Length, 9.3; pronotum length × width, 2.7 × 3.7; tegmen length, 9.5.

Neoloboptera Princis

Neoloboptera Princis, 1953: 174. Type species, *Neoloboptera indica* (Brunner) (= *Loboptera indica* Brunner), by monotypy.

Diagnosis. Tegmina and wings fully developed, or tegmina reduced in length, width normal, reaching to about T2 (Fig. 6A), hind wings small lateral pads. In fully winged taxa, tegmina with branched discoidal vein, discoidal sectors longitudinal (Fig. 4B) or longitudinal and weakly oblique (Fig. 4D); hind wing with narrow costal area, costal veins thickened, discoidal, median, and cubitus veins unbranched, the last two weakly or distinctly curved, apical triangle small (Figs 3C, 5B). Anteroventral margin of front femur with several large proximal spines, followed by a row of much smaller spines, some of similar length but stouter than piliform spinules, terminating in 3 large spines (Type A_3) (Fig. 5E); sometimes there are a few piliform spinules among the short heavier spines (Fig. 3D); pulvilli present on 4 proximal tarsomeres, tarsal claws symmetrical, simple, arolia present. Male: Abdominal terga unspecialized. Supraanal plate symmetrical, right and left paraprocts dissimilar (Fig. 3B). Subgenital plate symmetrical or weakly asymmetrical, lateral apodemes parallel (Fig. 3E). Styles absent. Hooklike genital phallomere on left side; associated with the median phallomere is a curved structure that is stout at one end and becomes threadlike apically (Figs 3E, 5F, 6B).



Figs 3A-3E.

Neoloboptera mandelsae n. sp., male paratype. A, terminal abdominal segments (dorsal); B, supraanal plate and paraprocts (ventral); C, hind wing; D, front femur (anterior); E, subgenital plate and genitalia (dorsal). Scales (mm): A, B, 0.5; C, 2.0; D, E, 0.5.

Comments. The genus *Neoloboptera* was based on a single species, *N. indica* which has reduced tegmina and vestigial wings. The two new species described below have fully developed tegmina and wings, but all other characters of importance agree with Princis's diagnosis of the genus, and I consider them to belong to that genus. It is significant that the males of the two winged forms have a curved filamentous structure associated with the median phallomere (Figs 3E, 5F), similar to the one found in brachypterous *N. indica* (Fig. 6B).

As indicated above, the genus *Blattellina,* based only on the female, has characters that essentially agree with females of winged *Neoloboptera mandelsae* and *N. reesei. Neoloboptera* may prove to be a synonym of *Blattellina. Neoloboptera* is close to *Jacobsonina,* but that genus has Type B front femur.

The following is a key to the males of three of the four species of *Neoloboptera*; the male of *N. hololampra* (CHINA) is unknown but the habitus of the female is similar to the male of *N. indica:*

1. Tegmina and hind wings fully developed 2
— Tegmina reduced, attingent, reaching to T2; hind wings vestigial (Fig. 6A). (INDIA) .... *indica*
2. Hind wing with distal part of subcostal vein curved towards and making contact with discoidal vein forming an elongated cell (Fig. 5B, arrow). Hind margin of supraanal plate deeply excavated (Figs 5C, 5D). (THAILAND) .... *reesei*
— Hind wing with subcostal vein not as above (Fig. 3C). Hind margin of supraanal plate shallowly concave (Figs 3A, 3B). (THAILAND) .... *mandelsae*

Neoloboptera mandelsae n. sp. (Figs 3A-3E, 4A, 4B)

Holotype, Male, THAILAND, Pak Thong Chai, 26.IV.1967, L. M. Roth (MNHG).

Paratypes, same data as holotype: 1♂, 1♀ (MNHG); 3♂ (1 with terminalia slide 411), 2♀ (1 with genitalia slide 412), 3 slides of ♂ genitalia, 1 slide of ♀ genitalia, 2 slides of tegmina, 2 slides of hind wings — all without associated pinned specimens (ANSP); 1♂, 2♀ (MCZH).

Etymology: The species is dedicated to Dr. Mary Mandels, microbiologist, pioneer in studies on cellulase, and dear friend.

Male. — Head with erect hairs, interocular distance about equal to distance between antennal sockets.

Pronotum with anterior margin truncate, sides and hind margin weakly convex.

Tegmina (Fig. 4B) and wings (Fig. 3C) fully developed.

Front femur Type A_3 (the first of the 3 terminal spines may be only slightly longer than the short stout spines just preceding it) (Fig. 3D). Supraanal plate transverse, hind margin shallowly concave (Fig. 3A), right and left paraprocts dissimilar (Fig. 3B). Subgenital plate weakly asymmetrical, apically rounded, extending beyond hind margin of supraanal plate (Figs 3A, 3E). Genitalia as in Fig. 3E: hook on left side with a subapical incision, median phallomere a slender rod, beneath it a curved filamentous structure, right phallomere somewhat reduced but remnants of a cleft visible.

Female. Supraanal plate convexly rounded (Fig. 4A), hind margin reaching hind margin of subgenital plate. Genitalia as in Fig. 4A.

Coloration: Head reddish brown. Pronotum dark reddish brown, lateral regions hyaline or subhyaline. Tegmina light brown, costal vein region colorless, as is that part of the right tegmen covered by the left (Fig. 4B). Hind wing lightly infuscated, costal vein area darker, veins dark brown. Abdominal terga and sterna brown, anterior segments lighter. Legs pale.

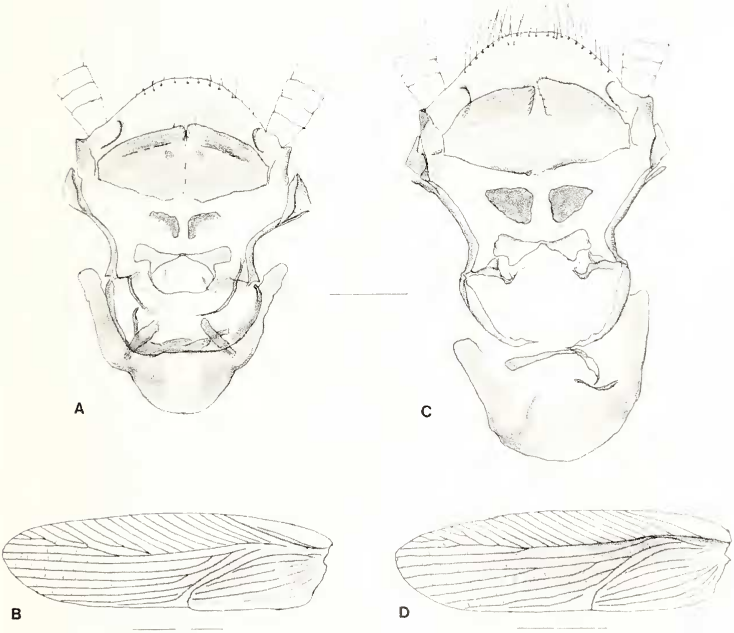
Measurements (mm) (♀ in parentheses). Length, 6.5-6.8 (6.2-7.5); pronotum length × width, 1.7-1.9 × 2.3-2.5 (1.8-2.1 × 2.5-2.9); tegmen length, 6.6-7.1 (6.9-7.8).

Neoloboptera reesei n. sp. (Figs 4C, 4D, 5A-5F)

Holotype, Male, THAILAND, Pak Thong Chai, 26.IV.1967, L. M. Roth (MNHG).

Paratypes, same data as holotype, 1♂, 1♀ (MNHG); 2♂ (1 with terminalia slide 413), 3♀ (1 with genitalia slide 414); 2 slides with ♂ genitalia, 2 slides with ♀ genitalia, 1 slide with ♂ tegmina, 1 slide with ♂ hind wings — all without associated pinned specimens (ANSP); Bangkhen, Bangkok, THAILAND, 1♂, 4.V.1967, N. Kobayashi; same data as holotype, 1♀ (MCZH).

Etymology: The species is dedicated to Dr. Elwyn Reese, mycologist, pioneer in the study of fungal enzymes, and friend.



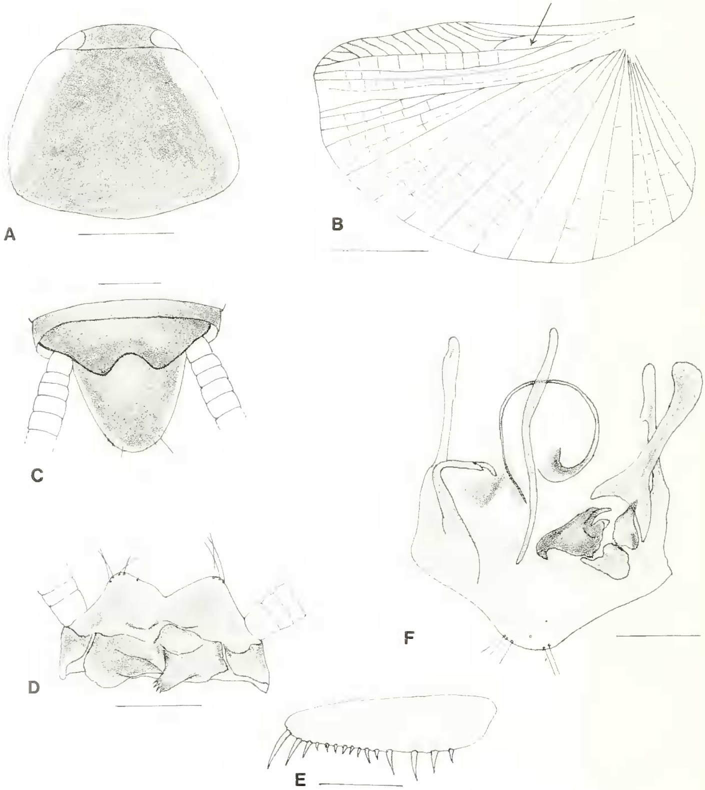
FIGS 4A-4D.

Neoloboptera spp., paratypes. A, B, *N. mandelsae* n. sp., female genitalia (ventral), and left tegmen. C, D, *N. reesei* n. sp., female genitalia (ventral), and male left tegmen. Scales (mm): A, C, 0.5; B, D, 2.0.

Male. Differs from the closely related *N. mandelsae* as follows: Hind wing with distal part of subcostal vein forked, curved towards and making contact with discoidal vein forming an elongated cell (Fig. 5B, arrow). Hind margin of supraanal plate deeply excavated (Figs 5C, 5D). Subgenital plate symmetrical extending well beyond hind margin of supraanal plate (Figs 5C, 5F). Genitalia as in Fig. 5F.

Female. Front femur as in Fig. 5E. Supraanal plate and genitalia as in Fig. 4C.

Coloration: Dark brown or dark reddish brown. Lateral borders of pronotum hyaline, subhyaline, or opaque yellowish white (Fig. 5A). Tegmina with anterior region



FIGS 5A-5F.

Neoloboptera reesei n. sp., male paratype from Pak Thong Chai, THAILAND. A, pronotum; B, hind wing (arrow indicates elongated cell); C, supraanal and subgenital plates (dorsal); D, supraanal plate and paraprocts (ventral); E, front femur (anterior); F, subgenital plate and genitalia (dorsal). Scales (mm): A, 0.5; B, 2.0; C-F, 0.5.

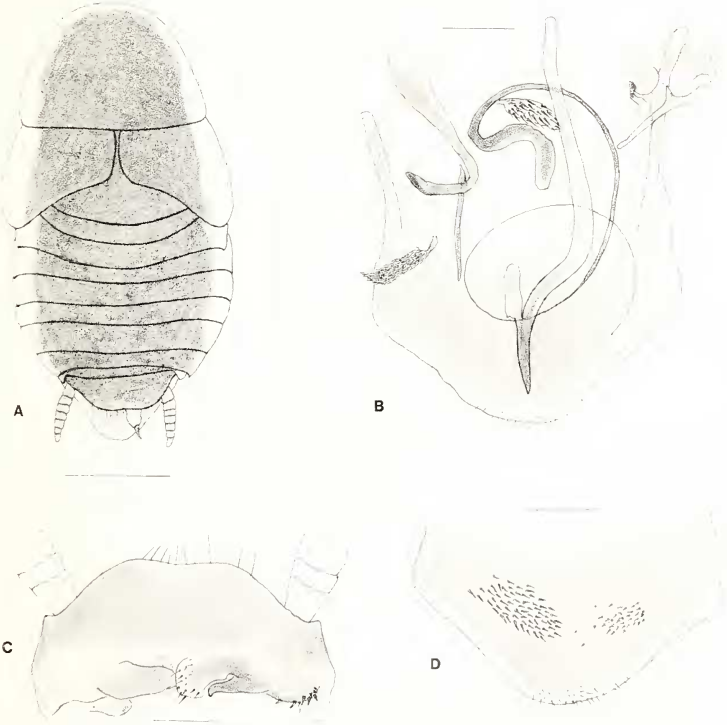
pale, the color a continuation of the lateral regions of pronotum, remainder dark reddish brown (Fig. 4D). Hind wing pale, costal region may be whitish, distal region may be weakly infuscated.

Measurements (mm) (♀ in parentheses). Length, 6.7-7.0 (6.8-8.5); pronotum length × width, 1.8-2.0 × 2.3-2.7 (2.0-2.3 × 2.5-2.9); tegmen length, 6.5-7.9 (7.1-8.2).

Neoloboptera indica (Brunner) (Figs 6A-6D)

Loboptera indica Brunner, 1865: 82 (♂).
Neoloboptera indica (Brunner): Princis 1953: 175; 1969: 857.

Holotype, Male (terminalia slide 49), Ostindien, Stevens No. 2830, *ex* coll. Brunner v. Wattenwyl (NMWA).



Figs 6A-6D.

Neoloboptera indica (Brunner), male holotype. A, habitus; B, subgenital plate and genitalia (dorsal); C, supraanal plate and paraprocts (ventral); D, subgenital plate (ventral). Scales (mm): A, 2.0; B-D, 0.5.

Male. Habitus shown in Fig. 6A. Interocular space greater than distance between ocellar spots.

Pronotum parabolic.

Tegmina reduced, attingent at sutural margin, distal margin obliquely subtruncate reaching to T2, veins practically obsolete. Hind wings vestigial hidden under tegmina.

Front femur Type A_3.

Supraanal plate transverse, hind margin subtruncate corners rounded, not reaching hind margin of subgenital plate; right and left paraprocts dissimilar (Figs 6A, 6C). Subgenital plate symmetrical, hind margin rounded; ventral surface with 2 groups of spines, those on the right side larger (Figs 6B, 6D). Genitalia as in Fig. 6B: left hooklike phallomere with a subapical incision; distal region of median phallomere curved, apically acute [this part of the phallomere was visible in the pinned specimen, surrounded by a membrane and protruding from between the supraanal and subgenital plates (Fig. 6A)]; beneath the median phallomere is a large curved sclerite that tapers distad becoming filamentous; right phallomere reduced but cleft portion is still retained.

Coloration: General color shiny black. Head shiny black, labrum and clypeus pale. Pronotal disk black, lateral and anterior borders yellow. Tegmina black with a broad yellow band along anterior border and continues along the sides of the the black abdominal terga and sterna (Fig. 6A). Cerci black, legs dark brown, edges of coxae whitish yellow.

Female. Unknown (see comments under *Neoloboptera hololampra*).

Measurements (mm). Length, 7.7; pronotum length × width, 2.4 × 3.5; tegmen length, 2.2.

Comments. Other than the holotype from east India, the only other record appears to be that of an immature specimen from Nursistan, Wama, Afghanistan (PRINCIS 1953: 175). If *Neoblattella indica* proves to be a *Blattellina* (type species, *Blattellina indica*) than it will become a homonym and will require a new name.

Neoloboptera hololampra Bey-Bienko

Neoloboptera hololampra Bey-Bienko, 1958: 676, fig. 7 (♀); 1957: 899 (nomen nudum until 1958); PRINCIS 1969: 857.

Holotype (not examined), Female, Yünnan, China, road between Paoshan-Yungp'ing, 28.V.1955, T. Buschik (Zoological Institute USSR Academy Sciences, Leningrad).

Male. Unknown.

Female (from BEY-BIENKO). Eyes widely spaced.

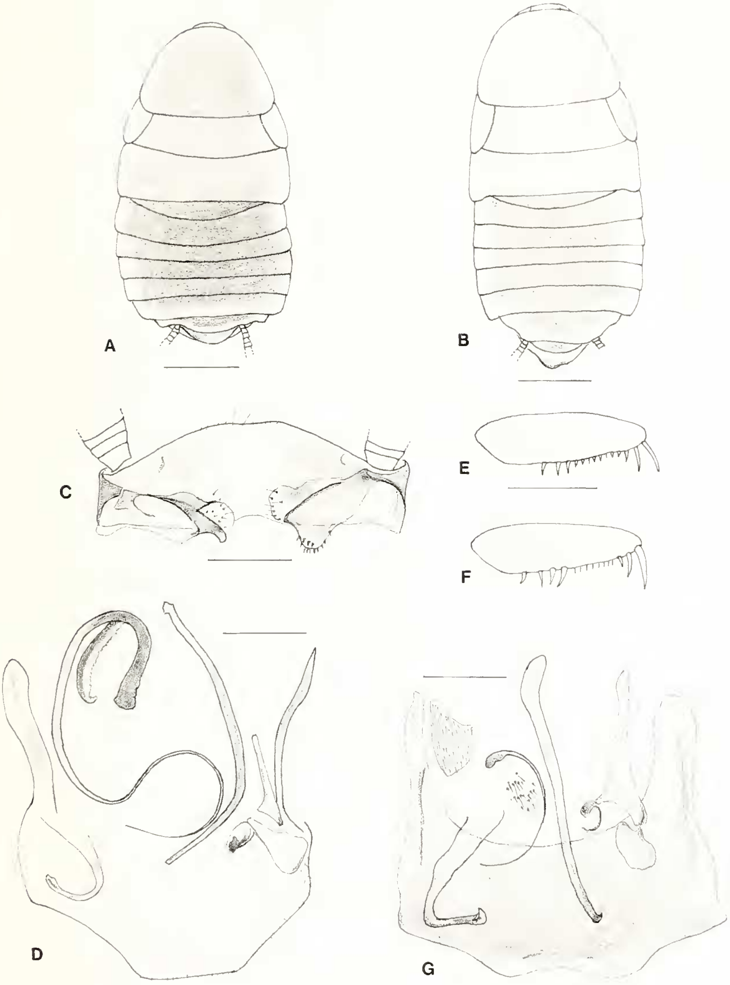
Pronotum moderately transverse, hind margin slightly rounded and obtuse-angulate.

Tegmina reduced [reaching to about T1], contiguous on sutural margin, distal margin truncate, veins subobsolete, anal furrow indistinct. Hind wings rudimentary, completely covered by tegmina.

Front femur Type A_3, arolia well developed.

Supraanal plate transverse-triangular, apex weakly concave. Subgenital plate with an obtuse-angulate concavity in middle of hind margin, anterior to it basally with a short longitudinal keel.

Coloration: Black, shiny, with a light band along sides of body. Head black, smooth, shiny. Pronotum black with pale lateral and anterior borders. Tegmina black, costal border pale. Abdominal sterna black with light edging along sides. Supraanal plate with



FIGS 7A-7G.

Loboptera spp. A-D, *L. loboptera* (Princis): A, female paratype, habitus; B-D, male holotype: B, habitus; C, supraanal plate and paraprocts (ventral); D, subgenital plate and genitalia (dorsal). E-G, *L. decipiens* (Germar): E, front femur (anterior) from Nimes; F, front femur (anterior) from Rome; G, male subgenital plate and genitalia (dorsal), from Rome. Scales (mm): A, B, 2.0; C-G, 0.5.

light spot near apex. Cerci short, proximal two thirds black, remainder light yellow. Legs reddish, straw colored, edges of femurs and tibiae brown, coxae a brown mixture.

Measurements (mm). Body length, 9.5; pronotum length, 2.7; tegmen length, 2.3.

Comments. The habitus drawing (fig. 7 *in* BEY-BIENKO 1958) and description of *hololampra* strongly resembles that of *N. indica.* BEY-BIENKO stated that his species differs by having the hind margin of the tegmina truncate (obliquely concave in *indica*). If this is the only difference between the two taxa then *hololampra* may prove to be the female and synonym of *indica.*

Loboptera Brunner

Loboptera Brunner, 1865: 79; BEY-BIENKO 1950: 166; PRINCIS 1965: 12; 1969: 849 (references). Type species, *Blatta decipiens* Germar (BEY-BIENKO 1950: 166).

Diagnosis. Tegmina reduced to lateral pads reaching to about hind margin of mesonotum (Figs 7A, 7B). Hind wings absent. Front femur variable: anteroventral margin with a row of long stout spines which gradually become smaller towards apex of femur, and preapically with a row of short slender piliform spinules, apex with 3 (sometimes 4) large spines becoming successively longer (Type B_3 or Type B_4); sometimes there are coarser spines among the piliform spinules making them intermediate between Types A and B (BEY-BIENKO 1950). HEBARD (1922: 332) claimed that the front femur of *L. decipiens* is armed with a row of stout spines which decrease in size distad (Type A). The front femur of *Loboptera* may be Type A, B, or intermediate between the two (see *Comments*); pulvilli present on 4 proximal tarsomeres, tarsal claws simple, symmetrical, arolia present. Male: abdominal terga unspecialized. Styles absent. Hooklike genital phallomere on left side. Female: ootheca rotated prior to deposition.

Comments. The thickness of the row of short preapical setae apparently has determined the classification of the front femur. Piliform (hairlike) spinules following 1 or more large proximal spines refer to Type B, whereas a row of short heavy or stout spines the same length as the piliform spinules place it in Type A. The problem arises when the preapical row of setae includes both piliform and heavier spines of the same length. I have examined two specimens of *Loboptera decipiens* both determined by Hebard, and one had Type B_3 (Fig. 7F) and the other was intermediate with both piliform and stout setae (Fig. 7E). PRINCIS (1965: 12) claimed that the front femur is Type A_3 as did GURNEY & ROTH (1966: 203, fig. 7 and key) but the latter authors pointed out that the preapical spines are heavy though short. Since the armament of the front femur of the type species is variable, this character as a diagnostic feature for *Loboptera* should be Type A, Type B, or intermediate between Types A and B.

Loboptera is a widely distributed genus. PRINCIS (1969: 849) listed nine species, six of them from Morocco. In addition to north Africa, the genus occurs in the Canary Islands, Azores, Europe, and western Asia.

Loboptera decipiens (Germar) (Figs 7E-7G)

Loboptera decipiens (Germar): BRUNNER 1865: 80, pl. 2, figs 5A-C, B'-C' (♂ ♀); PRINCIS 1969: 850 (references to synonymy, distribution, and biology).

ITALY. Rome, Tomb of Maximus, 1♂ (terminalia slide 423), 1♀, 24.VII.1908, H. [det. by Hebard in 1924] (ANSP).

FRANCE. Nimes, 1♂, coll. Yersin [det. by and a gift of Dr. H. de Saussure] (ANSP).

"Ainab". 1♀, 9.VIII.1943, A. Djanian [det. by Rehn in 1948] (ANSP).

This, the type species of *Loboptera* has been thoroughly described and illustrated (e.g. BEY-BIENKO 1950: fig. 68). The front femur is Type A, Type B, or intermediate between the two (Figs 7E, 7F). The styleless subgenital plate, and genitalia are shown in Fig. 7G.

Coloration: Shiny. Head reddish brown or black. Dorsal surface of body blackish with a white yellowish band beginning on either side of the midline of pronotum, extending across part of tegmina, mesonotum, and abdominal terga; supraanal plate (♂ ♀) with a yellowish spot posteromedially. Abdominal sterna without lateral bands, or with a narrower, less distinct band.

Measurements (mm) (♀ in parentheses). Length, 8.4 (9.1-9.2); pronotum length × width, 2.3 × 3.6-3.7 (2.5-2.6 × 3.9-4.2); tegmen length, 1.6 (1.6-1.7).

Comments. The male genitalia of *Loboptera,* especially the filamentous sclerite associated with the median phallomere indicates a close relationship with *Neoloboptera.*

Loboptera loboptera (Princis) **n. comb.** (Figs 7A-7D)

Caboverdea loboptera Princis, 1962: 217, figs 21-22 (♂ ♀).

Holotype, Male (terminalia slide 58), KAMERUN int. Lagdo Bge, 24-27.VI.1909, S. G. Riggenbach (BZMB).

Paratype, same data as holotype, 1♀ (BZMB).

Male. Interocular space same as distance between antennal sockets.

Pronotum parabolic (Fig. 7B).

Tegmina reduced to lateral pads reaching to hind margin of mesonotum (Fig. 7B). Hind wings absent.

Front femur Type B_4 (the first of the stout terminal spines only slightly longer, but distinctly stouter, than the preceding piliform spinules; the most distal terminal spine does not reach middle of front tibia; there are 6 large proximal spines); only the left mid tarsus is intact and it has pulvilli on 4 proximal tarsomeres (according to PRINCIS, the hind tarsus has a pulvillus only on fourth tarsomere).

Abdominal terga unspecialized (Fig. 7B). Supraanal plate broadly rounded, entire, right and left paraprocts dissimilar (Fig. 7C). Subgenital plate almost symmetrical, styles absent (Fig. 7D). Genitalia as in Fig. 7D: genital hook on left side; median phallomere rodlike, curved distally, a tapering filamentous sclerite associated with it; right phallomere reduced, remnant of cleft present.

Coloration: Head light reddish brown, lateral regions of face paler, hyaline. Pro-, meso-, and metanotum, and tegmina, in part hyaline, light reddish brown. Abdominal terga darker reddish brown, lateral borders hyaline, similar in color, principally due to underlying tissue, to thorax (Fig. 7B). Abdominal sterna hyaline, pale reddish brown. Legs pale.

Female. Front femur Type B_3 with 4 large proximal spines (the longest most distal terminal spine does not reach middle of front tibia); all tarsi with pulvilli on 4 proximal tarsomeres, those on hind tarsus very small. Supraanal plate convexly rounded, entire (Fig. 7A).

Coloration: Head light reddish brown, occiput and lateral regions of face yellowish brown. Pro-, meso-, and metanotum light reddish brown, their lateral borders, and tegmina, dull yellowish, hyaline. Abdominal terga blackish brown, lateral borders yellowish, hyaline, a continuation of the lateral borders of metanotum (Fig. 7A). Abdominal sterna dark reddish brown, lateral borders narrowly yellowish.

Measurements (mm) (♀ in parentheses). Length, 8.8 (9.0); pronotum length × width, 2.4 × 3.7 (2.4 × 3.7); tegmen length, 1.4 (1.4).

Comments. PRINCIS (1959: 281) erected the monotypic genus *Caboverdea* based only on the female (male unknown) of *Caboverdea cincta* Princis. His diagnosis of *Caboverdea* follows: Tegmina reduced, quadratic, sutural margins contiguous but not overlapping. Hind wings reduced to small lateral lobes. Front femur Type B_3 with the distal spine very long, reaching to about middle of front tibia; hind tarsus with a pulvillus only on fourth tarsomere, tarsal claws symmetrical, unspecialized, arolia present.

PRINCIS (1969: 870) listed three species of *Caboverdea,* namely, *cincta* Princis (Cape Verde Island; KUMAR 1975: 100, recorded it from Ghana), *loboptera* Princis (Cameroon), and with a query, *chevalieri* Chopard (= *Temnopteryx chevalieri* Chopard). Of these three taxa I have examined only *loboptera* whose male lacks styles. Whether or not the absence of styles is a generic character for *Caboverdea* remains to be determined when the male of the type species *cincta* is found. Apparently, based on *C. loboptera,* PRINCIS (1962: 218) revised his generic diagnosis of the genus by stating that the tegmina could be small lateral pads and the hind wings absent, but he did not use any male characters.

The female of *Caboverdea loboptera* does not agree with PRINCIS's generic diagnosis in that the distal terminal spine does not reach the middle of the front tibia, and the hind tarsus has small pulvilli on all 4 proximal tarsomeres. The basic similarity of the male genitalia, and the absence of styles in *Caboverdea loboptera* and *Loboptera decipiens* is strong evidence that these taxa are congeneric, and therefore I am transferring the former species to *Loboptera.*

Astyloblatta Bey-Bienko

Astylloblatta Bey-Bienko, 1954: 16; PRINCIS 1957: 141 (footnote, synonymized with *Jacobsonina*); 1969: 855 (synonymy under *Jacobsonina* incorrect). Type species, *Astyloblatta minuta* Bey-Bienko, by monotypy.

Diagnosis (♂ only, from BEY-BIENKO). Small, dark, with moderately shortened tegmina. Head thick, interocular space narrow; terminal segment of maxillary palps enlarged, 1.5 times length of fourth. Pronotum very protruberant, slightly wider than long, maximum width posterior to middle. Tegmina reach only to base of eighth tergum, narrowing distally, apex rounded; radial vein R, distinctly curved, branches of anterior cubitus vein (CuA) almost longitudinal, anal area reaches middle of tegmen. Wings distinctly shorter than tegmina. Ventral margins of front femur damaged, probably Type A, distally with 2 long spines, tarsal pulvilli weak on 4 proximal tarsomeres, tarsal claws symmetrical, simple, arolia distinct. Subgenital plate moderately asymmetrical, hind margin rounded. Styles absent. Abdominal terga unspecialized (BEY-BIENKO did not list this as a diagnostic character, but mentions it in the description of the type species).

Comments. According to BEY-BIENKO, the systematic position of *Astyloblatta* is not clear but it is relatively close to the *Loboptera* group even though it has more developed flight organs.

Of the species discussed in this paper, *Astyloblatta* probably is close to *Neoloboptera* which has two species with fully developed tegmina and wings, and two taxa with reduced tegmina (reaching to T1 or T2) and vestigial hind wings. The type species of *Astyloblatta* has tegmina that reach to T8, and its wings are distinctly shorter making it intermediate between the fully developed and reduced flight organs of the known species of *Neoloboptera*. In the absence of an examination of the male genitalia of *Astyloblatta minuta*, the principal generic difference, other than flight organ length, between it and *Neoloboptera* seems to be the front femur armament (Type A_2 vs A_3) and a difference of 1 terminal spine would not be sufficient to separate the two genera.

Astyloblatta minuta Bey-Bienko

Astyloblatta minuta Bey-Bienko, 1954: 17, fig. 10 (♂).
Blatta latistriga Bey-Bienko (nec Walker): PRINCIS 1957: 141 (footnote); 1969: 855 (synonymy with *minuta* incorrect).

Holotype (not examined), Male, Fudzjan: Shaou, CHINA, 500 m, 12.VI.1937, Klapperikh (Zoological Institute Academy of Science, Leningrad).

Male (from BEY-BIENKO). Small. Interocular space slightly less than distance between antennal sockets. Pronotum with hind margin slightly protruding. Tegmina relatively wide, narrowing towards apex. Abdominal terga unspecialized, ninth tergum short; supraanal plate short, wide, trigonal, apically rounded and slightly deflexed so that when seen from above the hind margin appears straight.

Coloration: General color black. Head black with distinct small yellow eyes; maxillary palps and antennae black. Pronotum black, distinct whitish and pale yellow edging laterally. Tegmina brownish black with pale yellow edging along anterior margin. Legs pale yellow mixed with blackish brown. Abdomen completely black. Cerci black (distal part missing).

Female. Unknown.

Measurements (mm). Body length, 7.5; pronotum length, 2.0; tegmen length, 4.9.

Dewittea Hanitsch

Dewittea Hanitsch, 1938: 7; PRINCIS 1963: 139 (diagnosis of genus incorrect, see comments).

Diagnosis (after HANITSCH: based on ♀). Tegmina and wings fully developed. Tegmina with cubitus vein bifurcate, discoidal sectors slightly oblique; hind wing with discoidal vein bifurcate, subcostal veins thickened, cubitus simple, apical triangle narrow. Front femur Type B, tarsal claws simple, symmetrical, arolia present.

(after Princis: based on ♂ and ♀). Tegmina with M and Cu separated and veins M + Cu almost longitudinal. Costal veins of hind wing distinctly clubbed. Male: abdominal terga unspecialized. Styles absent and replaced by "specialized structures". Front femur Type B_3, tarsal claws equal, unspecialized.

I have examined HANITSCH's type of *D. atrofusca* and disagree with his interpretation of the front femur armament which I believe is Type A_3 rather than Type B. PRINCIS's diagnosis using males was based on specimens which are not *Dewittea* (see comments). My diagnosis of *Dewittea* based on the female of *atrofusca* is as follows:

Tegmina and wings fully developed extending beyond end of abdomen. Tegmen with an apically bifurcate branch arising beyond middle of discoidal vein. Hind wing with unbranched costal veins weakly thickened on distal halves, discoidal vein branched beyond middle, median and cubitus veins simple, straight, apical triangle small (Fig. 8C). Front femur Type A_3 (Fig. 8D, cp. Fig. 8E for Type B_3); tarsal claws symmetrical, unspecialized, pulvilli on 4 proximal tarsomeres, arolia present.

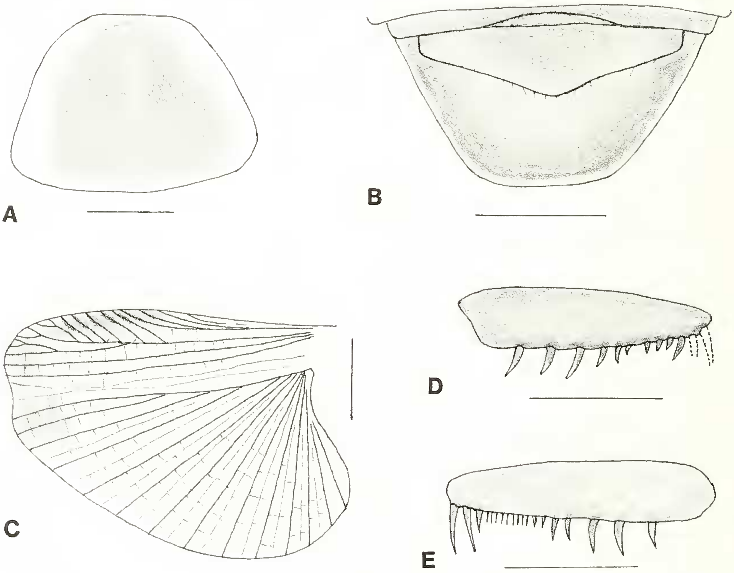
Comments. Since the male of *D. atrofusca* is unknown, PRINCIS based the male diagnostic characters of the genus on two species which he described as *D. globulifera* and *D. spinifera.* Contrary to PRINCIS's statement that *globulifera* has "specialized structures" instead of styles, these actually are styles (Fig. 9E). The complete diagnosis of *Dewittea* must await a description of the male which may or may not have styles. Because the front femur of *globulifera* is clearly Type B_3, and the median and cubitus veins are curved with the latter usually having a terminal branch, I am describing it as a new genus, *Nondewittea. Dewittea spinifera* lacks styles, or specialized structures, and is a species of *Jacobsonina,* which I will redescribe elsewhere.

Dewittea atrofusca Hanitsch (Figs 8A-8D)

Dewittea atrofusca Hanitsch, 1938: 8, fig. 2 (♀); KUMAR 1975: 110.

Holotype, Female, RUANDA, Ninda (2150), Parc Nat. Albert, 21-26.IX.1934, G. F. de Witte (MRAC).

Female. The following is in addition to the diagnostic features given for the genus: Interocular distance the same as space between antennal sockets. Pronotum strongly



FIGS 8A-8E.

A-D, *Dewittea atrofusca* Hanitsch, female holotype: A, pronotum; B, supraanal and subgenital plates (dorsal); C, hind wing; D, front femur (anterior). E, *Nondewittea globulifera* (Princis), front femur (anterior). Scales (mm): A, 1.25; B, 1.0; C, 2.0; D, E, 1.0.

convex, subparabolic, hind margin weakly rounded (Fig. 8A). Supraanal plate transverse, trigonal, apex rounded, not reaching hind margin of subgenital plate (Fig. 8B).

Coloration: Head brown with a broad black, irregular interocular band, and a light brown irregular macula between antennal sockets. Pronotum with disk dark brown to black, borders hyaline (Fig. 8A). Abdominal terga shiny dark brown, lateral edging pale. Abdominal sterna lighter brown, broad lateral borders darker, edging pale. Legs brown.

Measurements (mm). Length, 9.0; pronotum length × width, 2.5 × 3.3; tegmen length, 8.8.

Comments. HANITSCH described the left anterior femur as having "... 4 large spines followed by 8 piliform spines (Type B); 3 genicular spines". These "piliform" spines are distinctly heavier (Fig. 8D) than are piliform spinules characteristic of Type B (Fig. 8E). HANITSCH's "genicular" spines are the terminal spines; a genicular (knee) spine when present is more dorsal and is not considered as one of the terminal ventral spines.

Nondewittea n. gen.

Dewittea Hanitsch (in part): PRINCIS 1963: 139 (*Dewittea globulifera* only; *Dewittea spinifera* is a *Jacobsonina*). Type species, *Dewittea globulifera* Princis, by selection.

Diagnosis. Tegmina and wings fully developed, discoidal vein of former branched beyond middle. Hind wing with costal veins hardly thickened, discoidal vein not branched, median and cubitus veins weakly concave, the former simple, the latter with a short distal complete branch, incomplete rami absent, apical triangle subobsolete (Fig. 9F). Front femur Type B_3 (Fig. 8E); tarsal claws symmetrical, unspecialized, pulvilli present on 4 proximal tarsomeres, small arolia present. Male: Abdominal terga unspecialized. Right and left paraprocts dissimilar (Fig. 9B). Subgenital plate almost symmetrical, apodemes parallel, styles present (Fig. 9E). Genital hook on left side; filamentous accessory median sclerite present (Fig. 9E).

Nondewittea globulifera (Princis) **n. comb.** (Figs 8E, 9A-9G)

Dewittea globulifera Princis, 1963: 141, figs 33-34 (♂ ♀); KUMAR 1975: 111.

Holotype (not examined), Male, NIMBA, Keoulanta (GUINEA), 11.VI.1942 (Paris Museum).

Paratypes, same data as holotype, 1♂ (terminalia slide 408); Yalanzou, NIMBA (Guinea), 1♀, 11.VI.1942, M. Lamotte (ZILS).

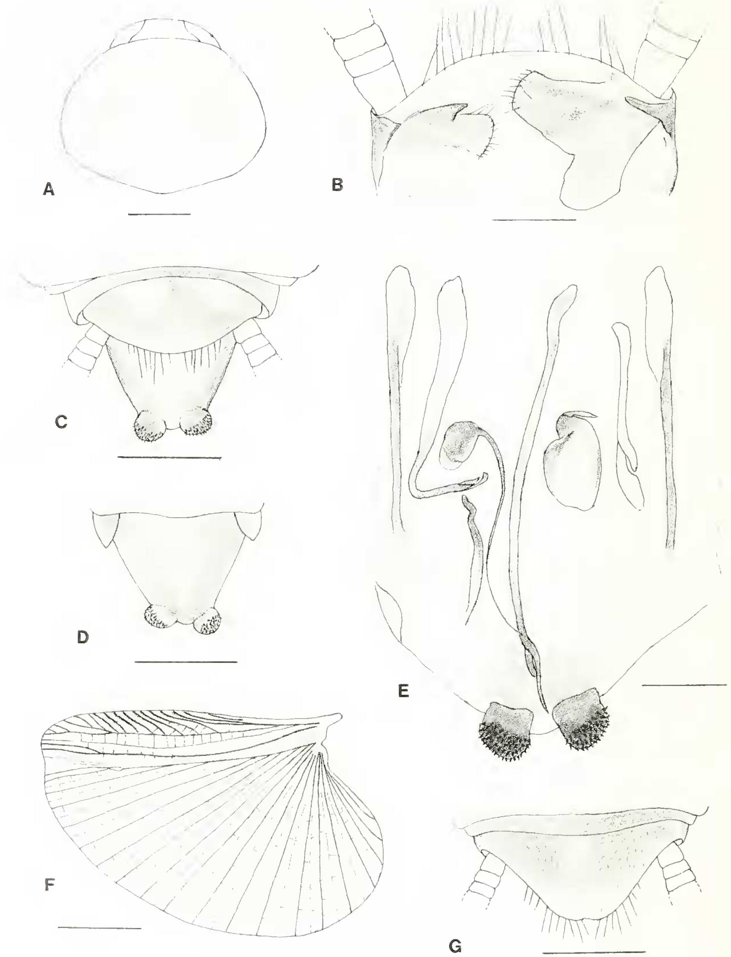
Male. Interocular space slightly more than interocellar distance and about same as space between antennal sockets; third and fifth segments of maxillary palps about equal, each somewhat longer than the fourth.

Pronotum suboval (Fig. 9A).

Discoidal vein of tegmen branched slightly beyond middle, the branch forked near apex. Hind wing with thickened costal veins (not clubbed), discoidal vein simple, cubitas vein with 1 short complete branch distad (Fig. 9F).

Front femur Type B_3 with 3 large and 4 smaller proximal spines (Fig. 8E).

Supraanal plate transverse, hind margin convexly rounded, entire; paraprocts dissimilar the right one a large uneven plate (Figs 9B, 9C). Subgenital plate trigonal, strongly convex, extending well beyond hind margin of supraanal plate; styles similar, small, bulbous, arising on dorsal surface on either side of midline, deflexed, their inner halves densely covered with small black spines (Figs 9C-9E). Genitalia as in Fig. 9E: hooklike phallomere on left side, with a subapical incision; median phallomere rodlike,



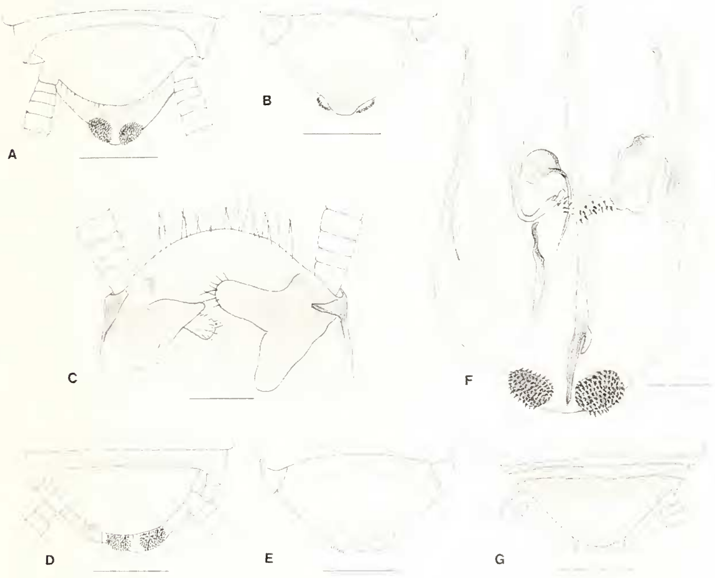
FIGS 9A-9G.

Nondewittea globulifera (Princis), paratypes. A-E, male from Keoulanta, NIMBA: A, pronotum; B, supraanal plate and paraprocts (ventral); C, supraanal plate and subgenital plates (dorsal); D, subgenital plate (ventral); E, subgenital plate and genitalia (dorsal). F, G, female from Yalanzou, NIMBA, hind wing, and supraanal plate (dorsal).
Scales (mm): A, 1.0; B, 0.5; C, D, 1.0; E, 0.5; F, 3.0; G, 1.0.

apex acute; associated with the median phallomere is a filament with an enlarged rounded base; cleft region of right phallomere present.

Coloration. Head dirty brown, monochromatic; maxillary palps light brown, last 2 segments darker; antennae blackish brown, 2 basal segments paler. Pronotal disk brown with some indication of a couple of dark spots, borders semihyaline (Fig. 9A). Tegmina dirty brown, humeral area paler, wings darkly infuscated. Abdominal terga dark brown, posterior segments darker, lateral borders light brown, supraanal plate with 2 pale raised anterior spots (Fig. 9C). Abdominal sterna and legs light brown.

Female. Supraanal plate trigonal, hind margin broadly rounded, weakly indented medially, reaching apex of rounded hind margin of subgenital plate (Fig. 9G). Abdominal terga 1-6 light brown, infuscated laterally, segments 7, 8 (T9 hidden) dark brown; supraanal plate pale distad, remainder dark brown except for light narrow longitudinal area (Fig. 9G).



Figs 10A-10G.

Nondewittea globulifera (Princis), variants, from Ivory Coast. A-F, males: A, supraanal and subgenital plates (dorsal); B, subgenital plate (ventral); C, supraanal plate and paraprocts (ventral); D, supraanal and subgenital plates (dorsal); E, subgenital plate (ventral); F, subgenital plate and genitalia (dorsal). G, female, supraanal plate (dorsal).
Scales (mm): A, B, 1.0; C, 0.5; D, E, 1.0; F, 0.5; G, 1.0.

Measurements (mm) (♀ in parentheses) (from PRINCIS). Length, 10.5-11.2 (10.0-11.5); pronotum length × width, 2.4-2.7 × 3.3-3.5 (2.5-2.8 × 3.2-3.6); tegmen length, 11.0-11.5 (10.5-11.0).

Comments. PRINCIS claimed that the bulbous structures at the apex of the male subgenital plate are not styles. They are not a continuation of the margin of the subgenital plate as shown in PRINCIS's fig. 33 but arise on the dorsal surface and are articulated (Figs 9C, 9E). I consider them to be styles and they resemble the styles found in some species of Australian *Neotemnopteryx*.

Variant (Figs 10A-10G)

IVORY COAST. Lamto (Toumodi), 2♂ (1 with terminalia slide 409, 2♀. 16.IX.1965, Gal. Bandama (ZILS).

Male. Interocular space about same as distance between ocellar spots, less than space between antennal sockets. Tegmina with discoidal vein branched at about middle, the branch bifurcate near apex (in one of four tegmina examined, the apexes of the branch, and discoidal vein were bifurcate). Hind wing with discoidal and median veins unbranched, median and cubitus veins distinctly concave, the latter with 1 complete branch distad, apical triangle subobsolete. Front femur Type B_3 with 8-10 large proximal spines that decrease in length, followed by a row of 4-7 piliform spinules and 3 terminal spines. The following characters differ from the typical form: Supraanal plate more convexly rounded (Figs 10A, 10C, 10D). Subgenital plate less elongated, styles with shorter non-setose base so that they are hardly deflexed (Figs 10A, 10B, 10D, 10E). Genitalia with a small, minutely spined sclerite that lies over the median sclerite between the right and hooklike left phallomeres (Fig. 10F); this was not seen in the paratype male (Fig. 9E), but the structure may have been lost during slide preparation.

Coloration. Similar to typical specimen but the lighter areas are more pronounced on abdominal terga.

Female. Interocular space less than distance between ocellar spots and about same as space between antennal sockets. Supraanal plate with apex not indented (Fig. 10G).

Measurements (mm) (♀ in parentheses). Length, 11.0-11.7 (11.0-12.0); pronotum length × width, 2.7 × 3.4-3.7 (2.7-2.8 × 3.4); tegmen length, 11.7-12.0 (10.5-11.0).

Comments. The variant differs principally from the typical morph by the more convexly rounded hind margin of the supraanal plate (♂ and ♀), the less elongated subgenital plate and shorter styles (♂). If no intermediate forms are found between the specimens from Guinea and Ivory Coast then the variant may be a subspecies or distinct species.

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